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Chapter · January 2010

DOI: 10.1057/9780230279384_1

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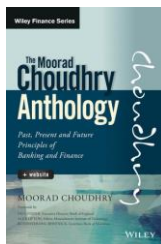


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Chapter 001

INTRODUCTION TO FINANCIAL MARKET INSTRUMENTS

Professor Moorad Choudhry

This book is concerned with the valuation and analysis of capital market securities, and associated derivative instruments, which are not *securities* as such but are often labelled thus. The range of instruments is large and diverse, and it would be possible to stock a library full of books on various aspects of this subject. Space dictates that the discussion be restricted to basic, fundamental concepts as applied in practice across commercial and investment banks and financial institutions around the world. The importance of adequate, practical and accessible methods of analysis cannot be understated, as this assists greatly in maintaining an efficient and orderly financial system. By employing sound analytics, market participants are able to determine the fair pricing of securities, and thereby whether opportunities for profit or excess return exist.

In this chapter we define cash market securities and place them in the context of corporate financing and capital structure; we then define *derivative* instruments, specifically financial derivatives.

B. Capital market financing

In this section we briefly introduce the structure of the capital market, from the point of view of corporate financing. An entity can raise finance in a number of ways, and the flow of funds within an economy, and the factors that influence this flow, play an important part in the economic environment in which a firm operates. As in any market, pricing factors are driven by the laws of supply and demand, and price itself manifests itself in the *cost of capital* to a firm and the *return* expected by investors who supply that capital. Although we speak in terms of a corporate firm, many different entities raise finance in the capital markets. These include sovereign governments, supranational bodies such as the World Bank, local authorities and state governments, and public sector bodies or *parastatals*. Equity capital funding though tends to be the preserve of the firm.

C. Financing instruments

The key distinction in financing arrangements is between *equity* and *debt*. Equity finance represents ownership rights in the firm issuing equity, and may be raised either by means of a share offer or as previous year profits invested as retained earnings. Equity finance

is essentially permanent in nature, as it is rare for firm's to repay equity; indeed in most countries there are legal restrictions to so doing.

Debt finance represents a loan of funds to the firm by a *creditor*. A useful way to categorise debt is in terms of its maturity. Hence very short-term debt is best represented by a bank overdraft or short-term loan, and for longer-term debt a firm can take out a bank loan or raise funds by issuing a bond. Bonds may be secured on the firm's assets or unsecured, or they may be issued against incoming cash flows, which is known as securitisation. The simplest type of bond is known as a *plain vanilla* or *conventional* bond, or in the US markets a *bullet* bond. Such a bond features a fixed *coupon* and fixed *term to maturity*, so for example a US Treasury security such as the 6% 2009 pays interest on its nominal or face value of 6% each year until 15 August 2009, when it is redeemed and principal paid back to bondholders.

A firm's financing arrangements are specified in a number of ways, which include:

- the *term* or maturity: financing that is required for less than one year is regarded as short-term, and money market securities are short-term in this way. Borrowing between one year and 10 years is considered medium-term, while longer-dated requirements are regarded as long-term. There is permanent financing, for example preference shares;
- size of funding: the amount of capital required;
- the *risk* borne by suppliers of finance and the *return* demanded by them as the cost of bearing such risk. The risk of all financial instruments issued by one issuer is governed by the state of the firm and the economic environment in which it operates, but specific instruments bear specific risks. Secured creditors are at less risk of loss compared to unsecured creditors, while the owners of equity (shareholders) are last in line for repayment of capital in the event of winding-up of a company. The return achieved by the different forms of finance reflects the risk exposure each form represents.

A common observation¹ is that although shares and share valuation are viewed as treated as very important in finance and finance text books, in actual cash terms they represent a minor source of corporate finance. Statistics² indicate that the major sources of funding are retained earnings and debt.

C. Market mechanism for determining financing price

In a free market economy, which apart from a handful of exceptions is now the norm for all countries around the world, the capital market exhibits the laws of supply and demand. This means that the market price of finance is brought into *equilibrium* by the price mechanism. A simple illustration of this is given in figure 1.1, which shows that

¹ For example see Higson (1995) page 181.

² Ibid, see the table on page 180.

the cost of finance will be the return level at which saving and investment are in equilibrium.

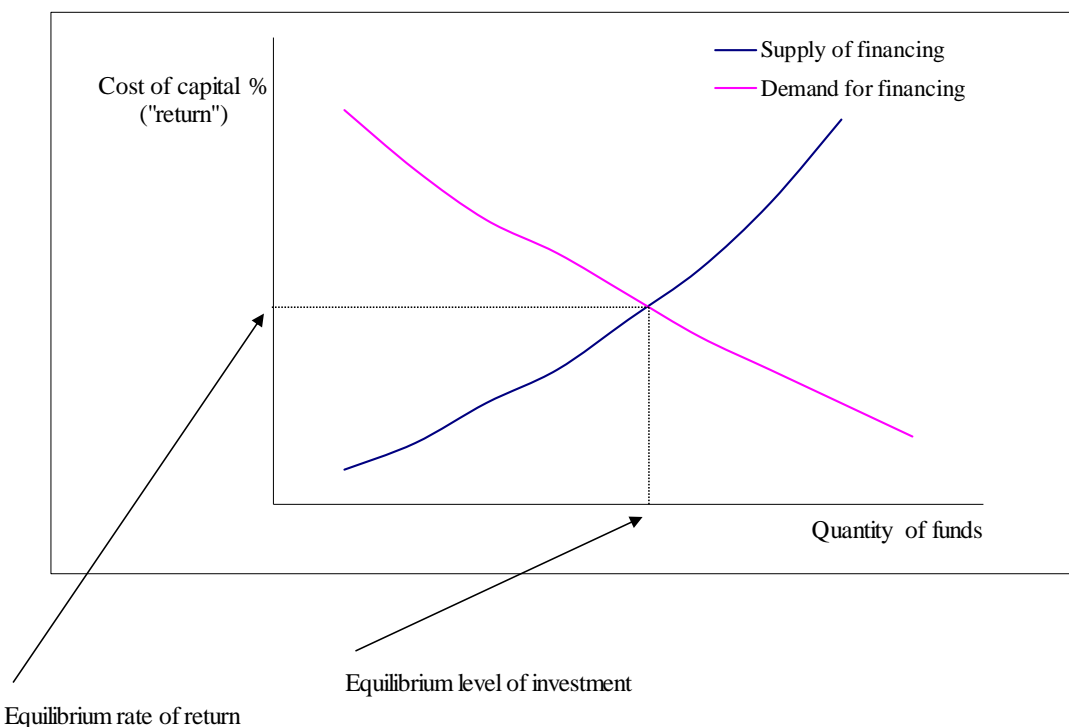


Figure 1.1 Financing supply and demand curves

In Figure 1.1 the supply curve sloping upwards represents the investors' willingness to give up an element of present consumption when higher returns are available. The demand curve sloping downwards illustrates an increasing pipeline of projects that become more worthwhile as the cost of capital decreases. In the pioneering work of Fisher (1930) it was suggested that the cost of capital, in fact the rate of return required by the market, was made up of two components, the real return r and the expected rate of inflation i . Extensive research since then has indicated that this is not the complete picture, for instance Fama (1975) showed that in the United States during the 1950s and 1960s, the change in the nominal level of interest rates was actually a reasonably accurate indicator of inflation, but that the real rate of interest remained fairly stable. Generally speaking the market's view on expected inflation is a major factor in driving nominal interest rates. On the other hand the real interest rate is generally believed³ to be driven by factors that influence the total supply of savings and the demand for capital, which include overall levels of income and saving and government policies on issues such as personal and corporate taxation.

We look briefly at firm capital structure in the chapter on equities.

³ For example, see Higson (1995), chapter 11.

C. Securities

The financial markets can be said to be an integration of market participants, the trading and regulatory environment (which includes stock and futures exchanges) and market instruments. These instruments can be further divided into cash securities and derivatives. Securities are known as cash market instruments (or simply *cash*) because they represent actual cash by value. A security product is issued by the party requiring finance, and such represents a liability to the issuer. Conversely a security is an asset of the buyer or holder. Contrary to what might be thought given the publicity and literature emphasis on derivatives, financial markets are first and foremost cash securities, with the market themselves being (in essence) a derivative of the wider economy.

In the first instance securities may be categorised as debt or equity. Such classification determines their ownership and participation rights with regard to the issuing entity. Generally speaking a holding of equity or *common stock* confers both ownership and voting rights. Debt securities do not confer such rights but rank ahead of equities in the event of a winding-up of the company.

Following this classification, securities are defined primarily in terms of their issuer, term to maturity (if not an equity) and currency. They may also be categorised in terms of:

- the rights they confer on the holder, such as voting and ownership rights;
- whether they are unsecured or secured against fixed or floating assets;
- the cash flows they represent;
- how liquid they are, that is the ease with which they can be bought and sold in the secondary market;
- whether or not they offer a guaranteed return and/or redemption value;
- the tax liability they represent;
- their structure, for example if they are hybrid or composite securities, or whether their return or payoff profile is linked to another security.

The characteristics of any particular security influence the way it is valued and analysed. Debt securities originally were issued with an annual fixed interest or *coupon* liability, stated as a percentage of *par* value, so that their cash flows were known with certainty during their lifetime. This is the origin behind the term *fixed income* (or in sterling markets, *fixed interest*) security, although for there many different types of debt security issued that do not pay a fixed coupon. Equity does not pay a fixed coupon as the dividend payable is set each year, depending on the level of corporate after-tax profit for

each year⁴, and even a dividend in time of profit is no longer obligatory, witness the number of corporations that have never paid a dividend, such as Microsoft Corporation.⁵

B. Derivative instruments

In this book we consider the principal financial derivatives, which are forwards, futures, swaps and options. We also briefly discuss the importance of these instruments in the financial markets, and the contribution they have made to market efficiency and liquidity. Compared to a cash market security, a derivative is an instrument whose value is linked to that of an underlying asset. An example would be a crude oil future, the value of which will track the value of crude oil. Hence the value of the future derives from that of the underlying crude oil. Financial derivatives are contracts written on financial securities or instruments, for example equities, bonds or other financial derivatives. In the following chapters we consider the main type of financial derivatives, namely forward contracts, futures, options and swaps. We ignore more derivatives of other markets such as energy or weather, which are esoteric enough to warrant separate, specialist treatment.

C. Forward contracts

A forward contract is a tailor-made instrument, traded *over-the-counter* (OTC) directly between the counterparties, that is agreed today for expiry at a point in the future. In the context of the financial markets a forward involves an exchange of an asset in return for cash or another asset. The price agreed for the exchange is agreed at the time the contract is written, and is made good on delivery, irrespective of the value of the underlying asset at the time of contract expiry. Both parties to a forward are obliged to carry out the terms of the contract when it matures, which makes it different to an *option* contract.

Forward contracts have their origin in the agricultural commodity markets, and it is easy to see why this is so.⁶ A farmer expecting to harvest his say, wheat crop in four months time is concerned that the price of wheat in four months may have fallen below the level it is at today. He can enter into a forward contract today for delivery when the crop is harvested; however the price the farmer receives will have been agreed today, so removing the uncertainty over what he will receive. The best known examples of forward contracts are forwards in foreign exchange (FX), which are in fact interest-rate instruments. A forward FX deal confirms the price today for a quantity of foreign currency that is delivered at some point in the future. The market in currency forwards is very large and liquid.

⁴ The exception is *preference shares* (in the US, preferred stock), which combine certain characteristics of equity with others of debt.

⁵ Given the performance of the company's share price since it was first listed, this fact is not likely to concern the owners of the shares too much.....

⁶ See the footnote on page 10 of Kolb (2000), who also cites further references on the historical origin of financial derivatives.

C. Futures contracts

Futures contracts or simply futures are exchange-traded instruments that are standardised contracts; this is the primary difference between futures and forwards. The first organised futures exchange was the Chicago Board of Trade, which opened for futures trading in 1861. The basic model of futures trading established in Chicago has been adopted around the world.

Essentially futures contracts are standardised, that means each contract represents the same quantity and type of underlying. The terms under which delivery into an expired contract is also specified by the exchange. Traditionally futures were traded on an exchange's floor (in the "pit") but this has been increasingly supplanted by electronic screen trading, so much so that by January 2001 the only trading floor still in use in London was that of the International Petroleum Exchange. The financial futures exchange, LIFFE, now traded exclusively on screen. Needless to say, the two exchanges in Chicago, the other being the Chicago Board Options Exchange, retained pit trading.

The differences between forwards and futures relate mainly to the mechanism by which the two instruments are traded. We have noted that futures are standardised contracts, rather than tailor-made ones. This means that they expire on set days of the year, and none other. Secondly, futures trade on an exchange, rather than OTC. Thirdly, the counterparty to every futures trade on the exchange is the exchange *clearing house*, which guarantees the other side to every transaction. This eliminates counterparty risk, and the clearing house is able to provide guarantees because it charges all participants a *margin* to cover their trade exposure. Margin is an initial deposit of cash or risk-free securities by a trading participant, plus a subsequent deposit to account for any trading losses, made at the close of each business day. This enables the clearing house to run a default fund. Although there are institutional differences between futures and forwards, the valuation of both instruments follow similar principles.

C. Swap contracts

Swap contracts are derivatives that exchange one set of cash flows for another. The most common swaps are interest-rate swaps, which exchange (for a period of time) fixed-rate payments for floating-rate payments, or floating-rate payments of one basis for floating payments of another basis.

Swaps are OTC contracts and so can be tailor-made to suit specific requirements. These requirements can be in regard to nominal amount, maturity or level of interest rate. The first swaps were traded in 1981 and the market is now well developed and liquid. Interest-rate swaps are so common as to be considered "plain vanilla" products, similar to the way fixed-coupon bonds are viewed.

C. Option contracts

The fourth type of derivative instrument is fundamentally different from the other three products we have just introduced. This is because its payoff profile is unlike those of the

other instruments, due to the optionality element inherent in the instrument. The history of options also goes back a long way, however practical use of financial options is generally thought of as dating from after the introduction of the acclaimed Black-Scholes pricing model for options, which was first presented by its authors in 1973.

The basic definition of option contracts is well known. A *call option* entitles its holder to buy the underlying asset at a price and time specified in the contract terms, the price specified being known as the *strike* or *exercise* price, while a *put option* entitles its holder to sell the underlying asset. A European option can only be exercised on maturity, while an American option may be exercised by its holder at any time from the time it is purchased to its expiry. The party that has sold the option is known as the writer and its only income is the price or *premium* that it charges for the option. This premium should in theory compensate the writer for the risk exposure it is taking on when it sells the option. The buyer of the option has a risk exposure limited to the premium he paid. If a call option strike price is below that of the underlying asset price on expiry it is said to be *in-the-money*, otherwise it is *out-of-the-money*. When they are first written or struck option strike prices are often set at the current underlying price, which is known as *at-the-money*.

For an excellent and accessible introduction to options we recommend Galitz (1995).

B. Securities and derivatives

Securities are commonly described as *cash* instruments because they represent actual cash, so that a 5% 10-year £100 million corporate bond pays 5 per cent on the nominal value each year, and on maturity the actual nominal value of £100 million is paid out to bond holders. The risk to holders is potentially the entire nominal value or *principal* if the corporate entity defaults on the loan. Generally the physical flow of cash is essential to the transaction, as for when an entity wishes to raise finance. For other purposes, such as hedging or speculation, physical cash flow is not necessarily essential and the objectives can be achieved with non-cash or off-balance sheet instruments. The amount at risk in a derivative transaction is usually, but not always, considerably less than its nominal value. The use of derivatives can provide users with near-identical exposures as in the cash market, such as changes in foreign exchange rates, interest rates or equity indices, but with reduced or no exposure to the principal or nominal value.

For instance a position in a 10-year £100 million sterling interest-rate swap has similar exposure to a position in the 10-year bond mentioned above, in terms of profit or loss arising from changes in sterling interest rates. However if the bond issuer is declared bankrupt, potentially the full value of the bond may be lost, whereas (if the same corporate is the swap counterparty) the loss for the swap holder would be considerably less than £100 million. As the risk with derivatives is lower than that for cash instruments (with the exception of writers of options), the amount of capital allocation required to be set aside by banks trading derivatives is considerably less than that for cash. This is a key reason behind the popularity of derivatives, together with their flexibility and liquidity. The issue of banking capital is a particularly topical one, as the

rules governing this is in the process of being reformed. We will therefore not discuss it in this book, however interested readers should consult Choudhry (2007)

In the next chapter we consider the basic building blocks of finance, the determination of interest rates and the time value of money.

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